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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: Greene, et al.  
 Serial No.: 07/804,474  
 Filing Date: 12/6/91  
 Group Art Unit: 3404  
 Examiner: H. Yuen  
 Title: METHOD AND APPARATUS FOR DISPOSING OF  
 WASTE MATERIAL

Honorable Commissioner of  
 Patent and Trademarks  
 Washington, D.C. 20231

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10/26/92Mary L. Niven  
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Enclosed please find an Appeal Brief for the above-referenced patent application and a check in the amount of \$135.00 for the necessary filing fee.

The Commissioner is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. 02-0384 of Baker & Botts, L.L.P.

Respectfully submitted,  
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 October 26, 1992



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Mary L. Kline  
 Name

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APPEAL BRIEFSTATUS OF THE CLAIMS

In the Office Action mailed June 30, 1992, the Examiner declared a final rejection of Claims 1 through 14 and 22 through 25. Claims 15 through 21 and 26 were withdrawn from consideration.

The Applicant now appeals the rejection of Claims 1 through 14 and 22 through 25.

STATUS OF AMENDMENTS

No Amendments have been filed subsequent to the Examiner's final rejection.

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SUMMARY OF THE INVENTION

The present invention relates to a method and apparatus for the complete incineration and filtration of hazardous waste materials and other types of discarded materials. An embodiment of the present invention comprises numerous modules that work together to incinerate waste material without producing dangerous or environmentally undesirable by-products.

The first module 30 is a feeding system with a shredder and air injection system 302-304. (FIGS. 1 and 3b). The air injection system blows waste material into the next module, the first combustion chamber 40. The injectors blow waste and air into the first combustion chamber along a trajectory 41 that suspends the waste material for a time sufficient to enhance incineration. (FIG. 3b).

The first combustion 40 chamber incinerates the waste material in an oxygen rich atmosphere. (FIGS. 4a and 4b). The injector system 302-304 produces the oxygen rich atmosphere by blowing air into the first combustion chamber in excess of the amount required for normal combustion. The firing of the waste material in the first chamber is further enhanced by a means for agitating the waste material. This chamber produces ash and exhaust, which contains gasses and particulate matter. The gasses and particulate are then delivered to a second combustion chamber 50.

The second combustion chamber 50 fires the exhaust in an oxygen starved atmosphere. (FIG. 5). The oxygen starved atmosphere of the second exhaust chamber is produced by a damper that restricts the air flow into the second chamber to an amount less than that required for normal combustion. The exhaust is retained in the second chamber for at least one second before being delivered to the next module, a cooling module.

The exhaust gasses are cooled in a cooling module 60 (FIG. 6) and then travel through a series of modules that help to remove particles, oxides of nitrogen, and help accelerate oxidizing reactions. The removal of these substances is accomplished with an electrostatic filtering module 701, a reducing catalyst module 70, and an oxidizing catalyst module 80

(FIG. 8). The exhaust gasses then pass through a liquid filtering module 90. (FIGS. 7a, 7b, 9a).

The liquid filter captures particulate matter in the exhaust and chemically treats the fired exhaust to reduce the quantity of CO, NO, SO, HCL, and SO<sub>2</sub> in the exhaust. The exhaust gasses may then be released into the atmosphere after passing through an acid neutralizer module 100. (FIG. 10).

#### ISSUE

Is the invention of the present application non-obvious as required by 35 U.S.C. section 103 and therefore patentable over U.S. Patent 4,958,578 to Houser, and U.S. Patent 4,949,652 to Hadley, in view of U.S. Patent 4,922,841 to Kent?

#### GROUPING OF CLAIMS

The Applicant considers each and every one of the rejected claims to be separately patentable.

#### ARGUMENTS

In the Office Action mailed March 18, 1992, the Examiner rejected Claims 1-14 and 22-25 as unpatentable over U.S. Patent 4,949,652 to Hadley in view of U.S. Patent 4,922,841 to Kent. In response to that Office Action, Applicants amended claims to add the limitation of an air injector, for producing an oxygen rich atmosphere, associated with the first combustion chamber and a damper, for producing an oxygen starved atmosphere, associated with the second combustion chamber. In a later Office Action mailed June 30, 1992, the Examiner declared a final rejection of Claims 1 through 14 and 22 through 25 based on 35 U.S.C. Section 103. In the June 30, 1992 Office Action, the Examiner indicated that the Applicants' invention was unpatentable over U.S. Patent 4,958,578 to Houser in view of U.S. Patent 4,922,841 to Kent. There are, however, numerous differences between the references and the present application, and these references, alone or together, do not show, teach, or suggest the novel incineration system requiring (1) the oxygen enriched first combustion chamber, (2) the oxygen starved second combustion chamber, and (3) the liquid filter of Applicants' invention.

A. The Houser Patent, U.S. Patent 4,958,578

The Houser patent discloses an incineration system that utilizes dual incineration chambers, a cooling unit, a scrubber, a separator, and a neutralizer, but the Houser patent does not show, teach, or suggest (1) an oxygen enriched first combustion chamber, (2) an oxygen starved second combustion chamber, or (3) a liquid filter as claimed by Applicants. The major differences will be presented below.

The Houser system has a first combustion chamber 10 that is merely fed with air at a rate required for normal combustion. Column 4, lines 28-37. The Applicants' claimed invention requires that air be injected at a rate in excess of that required for combustion in order to produce an oxygen rich atmosphere for the incineration conducted in the first chamber. Claim 1, line 3; Claim 22, line 5. This important aspect of Applicants' claimed invention allows for a rapid and more complete burn of the waste material and is not shown, taught, or suggested by Houser.

The Houser system also has a second combustion chamber or afterburner 17 that is fed with air 14. Air is not limited, Column 4, lines 64-68 and Column 5, lines 1-4, as required by Applicants' claims, which specify that the air flow into the second combustion chamber is limited so as to provide an oxygen starved atmosphere. Claim 1, lines 6-8; Claim 22, lines 9-11. The oxygen starved atmosphere promotes further burning of the waste material transported from the oxygen rich first chamber. This aspect of Applicants' claimed invention is not shown, taught, or suggested by Houser.

The Houser system uses a shredder 1 in conjunction with an auger 3 to load the waste material into a rotary kiln 10 (first combustion chamber). (FIG. 1). The Applicants claim a system and method for loading the waste material into the first combustion chamber 40 that is strikingly different from Houser's shredder-auger system. The Applicants' claimed invention provides a system for introducing the waste material and excess air by using air injectors 303 and chutes 302, 304 that allow for a specified trajectory 41 of the waste material into the first chamber 40. Claims 2-3. These claims require the introduction

of more air than is required for normal combustion, providing easy transportation of the waste, and development of the specified trajectory 41. The claimed specified trajectory 41 increases the exposure of the waste material's surface area to the burning environment of the first chamber 40. These important aspects of the Applicants' invention are not shown, taught, or suggested by the Houser reference.

The Houser patent also discloses a different system for preparing gasses and particulate for release into the atmosphere after exiting the second combustion chamber. Houser describes a system that uses a quenching tower 19, a scrubber 23, separator 26, and a neutralizer 33. (FIG. 2). Houser does not profess to reduce the oxides of nitrogen, CO, NO, HCL and SO<sub>2</sub> that may be found in the exhaust gasses as do the Applicants. Houser instead requires a smokestack for the remaining gasses to be discharged. See Column 5, lines 18-58. The present invention cools and cleans the gasses and particulate after they leave the second chamber by means of a liquid filtering system, Claim 1, lines 13-16, Claim 22, lines 16-23, not shown or suggested in any of the references relied upon by the Examiner. Applicants' claimed invention avoids the need for a smokestack (none is shown or described in Applicants' disclosure) because the liquid filter removes the smoke!

The Examiner's comments in the Office Action mailed June 30, 1992, reflect an apparent misapprehension of the present invention as well as the Houser patent. The Examiner stated that elements 1 through 4 of Houser composed an injector for blowing waste material into the first combustion chamber and implied that this "injector" was the same as the loading system of the Applicants' invention. As may be seen most clearly in FIG. 1 of Houser, elements 1 through 4 form a means of introducing waste to the primary combustion chamber, but the similarities to the present invention end there.

The Houser system uses a shredder with an auger to move waste into the chamber. The Houser system would tend to compress the waste as it travels through the auger and compaction tube 4. Referring to FIGS. 3a, 3b, and 4a of Applicants' disclosure, it can be seen that the Applicants' invention uses air introduced

through injectors 303 to propel the waste material down chute 304 so as to deliver the waste material to the primary chamber 40 with a specified trajectory 41. This injector-chute means of introducing waste material also injects excess oxygen into the first combustion chamber and is drastically different from what Houser shows, teaches, or suggests. Claims 2-3.

In the Office Action of June 30, 1992, the Examiner also implied that Houser's "packed bed of berl saddles," element 37, was functionally the same as the percolating, liquid filter module 90 of the present application. This statement also demonstrates a misapprehension by the Examiner as to the invention of the present application and the Houser patent. Houser explains that the unit, which includes element 37, is designed to reduce acidity of waste material that was halogenated. Column 5, lines 59-68; Column 6, line 1. The percolating, liquid filter module claimed by Applicants is very different from Houser's element 37. The liquid filtering module claimed by Applicants removes soluble compounds from the gasses and particulate by sending the gasses through the liquid so as to form a foam or froth which is circulated while the trapped bubbles rise to the surface and continue on to a neutralizer module 100. The liquid filter system not only operates differently than Houser but functions to remove completely different substances, e.g., CO, NO, SO, and SO<sub>2</sub>. Claim 1, lines 13-16; Claim 22, lines 20-23; Claim 25.

Similarly, the Examiner mischaracterizes the air supply to the first and second chamber of the Houser system. The Examiner indicated that "air injector means 9" supplies air to the first chamber and "damper means 14" controls air in the second chamber. The Examiner thus implies that Houser uses an injector to supply an oxygen rich atmosphere in the first chamber and an oxygen starved atmosphere in the second chamber. This is not accurate. The Houser patent clearly indicates that conduit 9 (the term used by Houser) supplies only the air required for a balanced mixture. Column 4, lines 28-37. Furthermore, what the examiner labels a "damper means" is not even mentioned in the text of Houser, but is depicted on FIG. 2 where it is simply labeled "air."

B. The Hadley Patent, U.S. Patent 4,949,652

Like Houser, the Hadley patent discloses an incineration system that is markedly different from Applicant's claimed invention.

Hadley discloses a dual combustion chamber arrangement, but like Houser, does not show, teach, or suggest using an oxygen rich atmosphere in the first chamber, an oxygen starved atmosphere in the second chamber, and a liquid filter. The present invention specifies such atmospheres for the chambers and a liquid filter. Claim 1, lines 2-4, 7-9; Claim 22 lines 4-6; 9-11.

The Hadley system uses a pneumatically operated ram feeder 12 for loading waste material into the first combustion chamber. (FIG. 1). This system notably differs from the air injector-and-chute design claimed by the inventors of the present application. Claim 1, lines 5-6; Claim 2. Furthermore, Hadley does not mention imparting a specified trajectory to the waste material as it enters the primary combustion chamber, while the Applicants claim this important aspect of their invention. Claim 3.

The Hadley patent discloses a very minimal system for cooling and cleaning gasses and particulate after they leave the second combustion chamber 16, and it is different from the liquid filter claimed by Applicants. The Hadley systems sends gasses and particulate through a bag house filter 20 then through an internal spraying area 41 and several packed-bed scrubbers 23, 25, 22 and then is pulled through a fan 32 that discharges to a smokestack. (FIG. 1). The Applicants' claimed invention incorporating a liquid filtering module avoids entirely the need for a smokestack. Claim 1, lines 13-16; Claim 22 lines 15-23. The filtering components or steps operate to remove or reduce oxides of nitrogen, CO, NO, HCL and SO<sub>2</sub> that the Hadley patent does not even mention, much less teach how to remove or reduce to a level that can be directly vented to the atmosphere.

C. The Kent Patent, U.S. Patent 4,922,841

The Kent system, like the previous two patents, is significantly different from the invention of the present application. The Kent system discloses a triple combustion chamber system 10, 26, 56 that uses a cooling and neutralizing tower and a couple of bag house filters to process gasses and particulate produced from combustion before venting them through a smokestack. (FIG. 1). Most of the differences between the previous two patents relied upon by the Examiner and the present invention hold true for Kent as well: The Kent system does not use an oxygen rich first chamber and an oxygen starved second chamber; does not use an air injection system that moves the waste material and imparts a specified trajectory; does not use a percolating, liquid filter; does not remove specified chemicals and heat from the gasses and particulate to a degree that the gasses and remaining particulate may be vented without a smokestack.

D. Conclusion

There are distinctive, critical differences between the Applicants' invention and the prior art. The three references cited as prior art do not show, teach, or suggest using air injectors to inject air and waste material into an oxygen rich first combustion chamber, delivering exhaust to an oxygen starved second combustion chamber, or using a liquid filter to remove the specified chemicals so as not to require a smokestack for release of the exhaust as expressly claimed by Applicants. Therefore, a rejection based on 35 U.S.C. section 103 was inappropriate. See *In re Bond*, 910 F.2d 831 (Fed. Cir. 1990) (indicating that it was improper for the Board of Patent Appeals and Interferences to affirm a rejection where there were critical differences between the invention and the prior art). Furthermore, the combination of all three of the prior art references does not teach the Applicants' claimed invention, and even if the combination did, there is no teaching or suggestion to combine the references. See *In re Stencil*, 828 F.2d 751, 754-55 (Fed. Cir. 1987) (stating that absent some teaching or suggestion that

a combination of references be made, it is not appropriate to combine references).

The Applicant's invention is not shown, taught, or suggested by any of the three prior art references cited by the Examiner in rejecting the application, and likewise, the combination of these references does not show, teach, or suggest the Applicants' invention. Therefore, the claims of the present application should be allowed.

Respectfully submitted,  
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APPENDIX

## Claims for U.S. Patent Serial No. 07/804,474

1. A waste disposal apparatus comprising:

a first combustion chamber for incinerating waste material in an oxygen rich atmosphere to produce ash and exhaust containing gasses and particulate matter;

an injector for blowing air into said first combustion chamber in excess of the amount required for normal combustion;

a second combustion chamber for firing said exhaust containing gasses and particulate matter in an oxygen starved atmosphere;

a damper for restricting air flow into said second combustion chamber to an amount less than that required for normal combustion; and

a liquid filter for capturing said particulate matter contained in said fired exhaust and for chemically treating said fired exhaust gasses to reduce the quantity of CO, NO and SO contained in said fired exhaust.

2. The apparatus of Claim 1 wherein said injector also blows waste material into said first combustion chamber.

3. The apparatus of Claim 2 wherein said injector blows said air and waste material into said first combustion chamber along a trajectory that suspends said waste material for a time sufficient to enhance incineration of said waste material.

4. The apparatus of Claim 2 wherein said first combustion chamber further comprises means for agitating said waste material and said ash in said first combustion chamber.

5. The apparatus of Claim 1 wherein said exhaust is retained in said second combustion chamber for at least one second.

6. The apparatus of Claim 5 further comprising means for controlling the direction of exhaust flowing through said second combustion chamber.

7. The apparatus of Claim 1 further comprising a cooling chamber for mixing outside air with said fired exhaust discharged from said second combustion chamber.

8. The apparatus of Claim 7 further comprising an electrostatic filter for removing particles from said fired exhaust.

9. The apparatus of Claim 7 further comprising a reducing catalyst for treating said exhaust to neutralize or remove by-products of combustion contained in said fired exhaust.

10. The apparatus of Claim 7 further comprising an oxidizing catalyst for converting CO contained in said fired exhaust to CO<sub>2</sub>.

11. The apparatus of Claim 1 wherein said liquid filter comprises water and either urea or ammonia.

12. The apparatus of Claim 1 wherein said liquid filter comprises a thickening or jelling agent for increasing the viscosity of said liquid.

13. The apparatus of Claim 1 wherein said liquid filter includes means for agitating said liquid and for mixing said fired exhaust with said liquid.

14. The apparatus of Claim 1 further comprising means for cooling said filtered exhaust flowing from said liquid filter.

22. A waste disposal system comprising:  
means for reducing said waste material and for feeding said reduced waste material to said first combustion means;

a first combustion means for incinerating said reduced waste material in an oxygen rich atmosphere to produce an exhaust containing gasses and particulate matter;

means for blowing air into said first combustion means in an amount greater than that required for normal combustion;

a second combustion means for firing said exhaust containing gasses and particulate matter in an oxygen starved atmosphere;

means for controlling air flowing into said second combustion means to an amount less than that required for normal combustion;

means for removing particles from said fired exhaust;

first means for treating said fired exhaust to remove oxides of nitrogen;

second means for treating said fired exhaust to accelerate oxidizing reactions in said fired exhaust; and

liquid filter means for capturing said particulate matter contained in said fired exhaust and for chemically treating said fired exhaust gasses to reduce CO, NO, HCL and SO<sub>2</sub> contained in said fired exhaust.

23. The waste disposal system of Claim 22 wherein each of said means further comprises means for sensing each of said functions.

24. The waste disposal system of Claim 23 wherein each of said sensing means is connected to a means for monitoring and controlling each of said functions.

25. The apparatus of Claim 1 further comprising a means for mixing said captured particulate matter in said liquid filter to produce a foam or froth.